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ABSTRACT

This report provides detailed information as to how the Department of Community Colleges in North Carolina will provide a modern, efficient information system that will support both the administrative operations of the 59 institutions and the management information needs for the colleges as well as the department. The system-wide study has involved personnel in all functional areas of the colleges. The key points of the plan are as follows: (1) in 1997, a system-wide process to evaluate alternatives and develop plans for enhanced or new administrative computing systems was initiated, with more than 300 people involved in identifying needs for the system; (2) the State Board of Community Colleges approved a recommendation to purchase and customize an integrated information system; (3) the State Board approved the Expansion Budget request; (4) the Department of Community Colleges is preparing detailed specifications for a formal Request for Bids; and (5) the benefits include improving administrative operations of the 58 colleges through enhanced software applications and providing a management information system for both the colleges and the Department to use for planning, research, and reporting. (JJL)

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ED 432 342

Plan for an Efficient and Effective Technology and Management Information System for the North Carolina Community College System

Final Report on Senate Bill 1366

North Carolina Community College System

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Plan for an Efficient and Effective Technology and Management Information System for the North Carolina Community College System

To comply with Senate Bill 1366, Section 10.6, this plan for an efficient and effective technology and management information system for the North Carolina Community College System was approved by the State Board of Community Colleges on January 15, 1999. In accordance with the provisions of S.B. 1366, Section 10.6, the approved plan is submitted to the Joint Legislative Education Oversight Committee.

Executive Summary

The attached report provides detailed information as to how the Department of Community Colleges will provide a modern, efficient information system that will support both the administrative operations of the 59 institutions and the management information needs for the colleges as well as the department. The system-wide study has involved personnel in all functional areas of the colleges. The recommendation for a new integrated information system results from the finding that the current system is inadequate to meet today's needs and that a major overhaul to prepare the system for the next century is not feasible or economical.

The Department must secure adequate funding in this session for one-time purchase and development of software and for ongoing support for maintaining and upgrading. The data warehouse is a major new item to support management reporting and decision-making, analysis and research using historical data. The data warehouse and reporting systems are essential for responding to the legislature and to all other customers, prospective business clients, and other agencies requiring reports on the community colleges.

While the report explains the management information systems in some detail, staff in the department can provide concrete examples of how the system will improve operations at the 59 institutions and the reporting capabilities of the department. The real issue is the value of accurate and consistent data from all 59 institutions for reporting and accountability. Without this investment in a new information system, more of the community colleges will find it necessary to contract with independent vendors for new software, and reporting on the system will become more difficult with non-standardized systems in place. Presently there are two community colleges whose needs are not adequately met by the administrative software provided by the Department, and the costs of the software, the additional staff, and the inability to provide data immediately as often is required to respond to special requests can not be measured. This investment in the long run will save the State funds through a single management information system that serves the needs of all 59 institutions and the Department.

The presidents of the 59 institutions have unanimously and repeatedly supported the primary goal and assumption of the project: to acquire, implement and support an integrated information system that meets the needs of all of the institutions. The presidents recognize not only the benefits of such an information system being used by all of the institutions, but also the

nearly overwhelming cost and effort that would be required for each college to install and support individual information systems that meet statewide needs and requirements. The two community colleges that have found it necessary to have separate information systems (because the current system did not meet their needs in the past) have been strong advocates of the new information system and are fully committed to early adoption.

Summary of Key Points of the Plan

1. In 1997 the Department of Community Colleges initiated a system-wide process to evaluate alternatives and develop plans for enhanced or new administrative computing systems. This initiative was in response to the North Carolina Community College Association of Presidents and the Association of Community College Business Officers. Over 300 community college personnel have been directly involved in identifying needs for an enhanced information system. The process has received input and support from the 58 community colleges for replacing the existing administrative information systems and adding a management information system.

2. The State Board of Community Colleges has approved a recommendation to purchase and customize an integrated information system. The recommendation is based upon a thorough evaluation of needs and of vendor responses to a Request for Information.

3. To implement the recommendation, the State Board of Community Colleges approved the 1999-2001 Expansion Budget request that includes $25 million in each year for Phase 1 of the information systems project and funding for college information technology support needs.

4. In preparation for the bid process, the Department of Community Colleges is preparing detailed specifications for a formal Request for Bids in the spring of 1999 to provide cost and implementation information. The Department of Community Colleges will use the new "Best Value in Information Technology Procurement" to insure that the new information system is the best solution for the colleges and the Department.

5. The benefits of this project include improving the administrative operations of the 58 colleges through enhanced software applications and providing for the first time a management information system for both the colleges and the Department to use for planning, research, and reporting. A single software license for all 58 community colleges will be significantly less expensive in both direct purchasing costs and ongoing human resources required for maintenance and support. Furthermore, this solution will address the needs of the General Assembly for consistent, accurate, and timely data from the Department of Community Colleges through standardization of all 58 community colleges data systems and the new data warehouse to support management information.

Plan for an Efficient and Effective Technology and Management Information System for the North Carolina Community College System

This Plan for an Efficient and Effective Technology and Management Information System for the North Carolina Community College System is in response to Senate Bill 1366 Section 10.6 of the 1998 legislature:

> The State Board of Community Colleges shall develop a plan for an efficient and effective technology and management information system. The system shall be designed to support the North Carolina Community College System's planning, evaluation, communication, resource management, full-time equivalent student (FTE) reporting, and decision-making processes. The plan shall identify the technology and management information needs of the local colleges and the Department of Community Colleges, the costs of meeting these needs, and the benefits of meeting them.
>
> The State Board shall report the Joint Legislative Education Oversight Committee prior to February 1, 1999, on the plan it develops.

1. Developing a plan for an efficient and effective technology and management information system.

History. Prior to 1984 the community colleges prepared manual reports on students, classes, staff and other data that were sent to the Department in printed form. In 1984, an effort began to computerize the administrative functions of all colleges with standard hardware and software applications. The software enabled colleges to computerize administrative operations: student registration, student records, accounts payable and receivable, and other business operations. It was not designed as a management information system to support decision making. On the contrary, it was designed to support the administrative functions of the colleges. The Department then had to develop programs to extract data from the colleges' operational databases to meet reporting requirements. The state-level applications for external reporting have increased dramatically over the last fifteen years, and the demands for new reports have outstripped the ability of the department to respond in a timely way.

After contracting with a vendor for the initial development of the software, the Department assumed full responsibility for the maintenance and development of new software applications in 1986. The initial computer system utilized Prime computers as the hardware and the Educator package as the software. In 1990 the wide area network was completed connecting all colleges. In 1991 Prime's decision to drop its support of Prime computers forced the colleges to migrate to Unix-based platforms.

This project was implemented with **no new State** funds and was never adequate to meet the needs of the largest community colleges. The resources allocated to the project

(known as the IIPS project) both at the Department and local college levels were barely adequate at its inception, and the increasing demand over the last fifteen years for improved applications has sorely out-paced the resources available.

For the first time the 1998 General Assembly funded eleven new technology positions for the department to support the 59 institutions and to respond to the increasing demand for data and information. These positions are essential for improving the quality of services to the colleges and to provide modifications and enhancements of current software to meet today's demands and will not be utilized to implement the new system. The need for these eleven positions has been well documented in studies over the last ten years and are essential to meet current demands for supporting the existing software. The colleges also received additional funds that partially met the resource needs documented in 1997. The additional funds are being utilized for current needs, and to implement the proposed integrated information system both the colleges and the department will require increased resources for technology support.

Current Study. In 1997 a study of the needs of the community colleges and the department for administrative and management information software was initiated. This study was in response to a call from the presidents through their association and data from a survey of the business officers for improved information systems. The survey results showed that nearly 80% of those responding supported an investigation of other options for administrative computing systems.

In April 1997, the president of the Department of Community Colleges appointed a Steering Committee for the "North Carolina Community Colleges Administrative Systems for the Future."

Based on information gathered from three focus groups involving more than 250 people from the community colleges, the Steering Committee's developed the following vision statement:

> *The comprehensive, fully integrated administrative system of the 21st century will support student-centered learning, management decisions, accountability to external constituencies, and business operations for all community colleges through a flexible, seamless electronic network that is accessible to all.*

The Steering Committee appointed the Project Management Team in December 1997. The Project Management Team's responsibilities are

-- to oversee the needs identification process;
-- to develop a requirements document and seek a solution; and
-- to recommend an administrative system solution congruent with the vision statement and the requirements articulated from the gap analysis.

2. Designing a system to support the North Carolina Community College System's planning, evaluation, communication, resource management, full-time equivalent student (FTE) reporting, and decision-making processes

The Project Management Team includes administrators and staff members from fifteen community colleges representing the following functional areas:

- -- Student-related functions: curriculum faculty, academic dean, continuing education, basic skills/literacy, registrar, financial aid, deans of student services, learning resources, planning & research.
- -- Business functions: financial reporting, budgeting, general ledger, human resources, personnel, payroll and benefits, accounts receivable, student accounts, cashier, auxiliary services, equipment, fixed assets, purchasing, accounts payable, facilities management, room scheduling, parking and safety.
- -- Technology evaluation.

The Project Management Team, working with functional working groups in each of the above areas, identified overall requirements that fulfill the Vision Statement:

- -- *Comprehensive, fully integrated administrative system that supports student-centered learning and business operations for all community colleges.*
  - -- Data must be entered once and shared among a variety of applications and users, both across the community college and System and statewide.
  - -- Information about students and employees must be accessible to all functions (with appropriate security) across the college (all depts. and functions), across the Community College System (all colleges) and across the State (all institutions and agencies) and inter-state in the future.
  - -- Enabling students to access and update their information, including application, registration, payment and other services, without requiring assistance or service from a staff member unless problems arise.
  - -- All systems and functions operate through electronic forms and workflow, rather than paper forms that are carried or sent from office to office.
- -- *Support management decisions, accountability to external constituencies and business operations for all community colleges.*
  - -- Information about all colleges is collected and stored centrally to accommodate information retrieval and reporting using historical data, including comparison of specific college data to community college system-wide data; and retrieving and reporting using specific data (individuals, programs, colleges) as well as program-, college- or system-wide data.
  - -- Data inquiry, reporting and analysis software tools that are appropriate for use by casual, intermediate and advanced users.

The Project Management Team developed a Request for Information to

A. provide information for decisions by the Steering Committee on the best combination of developing and purchasing software for meeting the information systems needs that have been identified;
B. provide information on the feasibility and estimated costs of potential strategies and solutions for use in developing funding proposals; and
C. identify potential vendors/partners for subsequent Request for Bids.

The Project Management Team evaluated the RFI responses based on the five alternatives, ranging from (a) purchasing an integrated information system that includes a comprehensive student information system, financial information system and human resources system and developing a System-level operational data base and a data warehouse to (b) continuing to have Information Systems staff use available technology to develop and support information systems that are integrated and designed to meet the specific requirements of the NC Community College System.

The evaluation of these alternatives considered the major themes (above) and the current and planned capabilities for each of the five areas.

Based on the Project Management Team's evaluation of the alternatives, purchasing, customizing and implementing an integrated information system that includes a student information system, financial information system and human resources system; developing a System-level operational data base and a data warehouse, and integrating and supporting specialized systems such as voice response, etc. as required will be the most effective strategy to meet the Community College System's requirements.

The advantages of this strategy include:

-- The purchased system is fully integrated and supported by a single vendor. The vendor is responsible for ongoing maintenance and enhancements which will be similarly integrated.
-- The systems use reasonably stable technology (equipment and software).
-- A large number of customers, including community colleges, use these systems

The strategy reflects the Project Management Team's conclusions that:

-- outdated systems have created the need for a "quantum" leap in functionality;
-- staff resources are insufficient to develop or partner with a vendor to develop a system from scratch and to fully support internally developed systems;
-- colleges are able to adjust institutional needs and priorities to match available vendor solutions;
-- development by staff in the Department will take too much time for implementation;
-- fully integrated administrative systems are required; and

-- the gap between the system-wide vision and off-the-shelf vendor solutions is manageable.

The primary limitation of this strategy is that the information systems must be customized to meet the mandated requirements of the NC Community College System, and such modifications will require ongoing maintenance and support by the Department in addition to that provided by the vendor. The new information systems may require colleges to change operating procedures, workflows, etc., as part of the implementation.

3. Identifying the technology and management information needs of the local colleges and the Department of Community Colleges

During the fall 1998, the Project Management Team members, working with functional work groups, developed detailed plans and specifications to address the following issues:

A. Implementation Plan and Schedule

1. Phase 1 of the implementation will be completed by June 30, 2001 and will include at least six community colleges, including two small colleges, two medium-sized colleges and two large colleges (in terms of FTE's).
   A. Planning of the "standard" configuration, including enhancements, etc., by representatives of the participating community colleges, the Project Management Team, Information Services' staff and the vendor.
   B. Software installation and configuration.
   C. Customization as required to provide a standard NCCCS version of the complete, integrated information system.
   D. Migration of data to the new information system.
   E. Technical and user training.
   F. Development of standard NC Community College System reports (as specified in the Annual Reporting Plan).
2. Following the completion of Phase 1, the Project Management Team will evaluate how well the information system meets the requirements in the bid specifications.
3. The vendor will make any required modifications to the "standard" system; the resulting changes will be implemented and tested by the community colleges participating in Phase 1.
4. When the "standard" system has been accepted in production by all of the Phase 1 colleges, Phase 2 implementation will begin.
5. Phase 2 will implement the "standard" system at the remaining community colleges over a two year period.

6. Department staff and contractors will develop the central "data warehouse" as a parallel project during Phase 1 to ensure that the data necessary for required reporting is collected and managed.
7. Department staff and contractors will add data and reporting capabilities to the data warehouse following the completion of Phase 1. It is expected that this effort will require two to three years of additional development effort.

B. Detailed requirements and specifications for software acquisitions

Functional working groups developed detailed specifications for the Request for Bids in the following areas:

-- Basic Skills
-- Continuing Education
-- Curriculum Student Records
-- Financial Aid
-- Human Resources Development
-- Student Management

-- Accounts Payable and Purchasing
-- Accounts Receivable and Bookstore
-- Facilities Management
-- Fixed Assets (Equipment and Inventory)
-- Financial Reporting, General Ledger and Budgeting

-- Human Resources (including Payroll)

-- Planning, Research and Institutional Effectiveness

-- Technology Specifications

These requirements are posted on the System Office Web site (at http://www.nccc s.cc.nc.us/~blackmun/sasf/RFBspec.htm). Revisions will continue to be posted on the Web site.

The requirements are the basis for the formal Request for Bids (RFB). The RFB will use the "best value" procurement method in compliance with S1188/H1357 "Best Value Information Technology Procurements"[1] This law includes the following definition:
"`Best Value' procurement means the selection of a contractor based on a determination of which proposal offers the best trade-off between price and

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[1] (see http://www.ncga.state.nc.us/html1997/bills/ratified/house/hbil1357.full.html)

performance, where quality is considered an integral performance factor. The award decision is made based on multiple factors, including: total cost of ownership, meaning the cost of acquiring, operating, maintaining, and supporting a product or service over its projected lifetime; the evaluated technical merit of the vendor's proposal; the vendor's past performance; and the evaluated probability of performing the requirements stated in the solicitation on time, with high quality, and in a manner that accomplishes the stated business objectives and maintains industry standards compliance."

The "Administrative Software Acquisition Project" developed by the Center for Information Services which supports Washington State's Community and Technical Colleges[2] has served as a model for this procurement.

The chief technology officer of the NC Information Resource Management staff, Ms. Emilie Schmidt, has agreed to work with the Community College System to pursue this procurement strategy with the Division of Purchase & Contract.

C. Strategies and plans for training and support

The Information Services section of the Department will manage the training and support for the implementation and operation of the new information systems.

Vendors are responsible for the training for the Phase 1 implementation. In Phase 2, the vendor(s) will train the community college system staff members who will then train staff at the community colleges implementing in Phase 2. Community College System staff will also provide ongoing training, retraining, and upgrade training after full implementation.

D. Upgrade college information technology infrastructure

The Technology Evaluation Team has surveyed the community colleges to determine the current and planned technology environment. This survey includes the central equipment (such as Unix systems and other servers), desktop computers and intra- and inter-campus networks. This information will be added to the technical specifications that are included in the RFB requirements.

The RFB specifications will require the vendors to indicate any equipment, network or software upgrades or enhancements that would be required to successfully implement and operate their proposed solutions. The cost of such

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[2] http://www.cis.ctc.edu/pub/asap/asap1.htm

upgrades, based on existing State convenience contracts, will be added to the vendors' bid prices to determine the total cost of each proposed solution, consistent with the "best value" approach.

The Department will be prepared to obtain bids for administrative software systems in the spring 1999.

4. Identifying the costs of meeting these needs

Based on the vendor's responses to the request for information, the cost estimates provided by the vendors, plus other associated costs for a data warehouse, indicate that the total cost will be $25 - 35 million for implementation (non-recurring) and $5 - 7 million annually (recurring) for maintenance and support.

The 1999-2001 Expansion Budget includes approximately $15.1 million in each fiscal year for the costs for acquiring, customizing and implementing Phase 1 of the college information systems and system-wide data warehouse. Completion of the bid process will provide specific cost and timetable requirements.

It is important to recognize that the current software that supports the community colleges and the System Office has been acquired, supported, enhanced and operated by the community colleges within the existing, FTE-based funding formula. Prior to the $10 million provided in the 1998-99 budget for information technology support (described above), no funds, except for a system administrator for each college, had been specifically provided in the operating budgets for this purpose.

5. The benefits of meeting the defined needs:

The primary benefit is that the community colleges and the Department will close the gap between the "present state" and the "future state" in the attached Gap Analysis. Specific benefits of the new system will include:

A. Data integration: data will be entered once and shared among a variety of applications and users, both across the community college and System and statewide.

B. Comprehensive tracking: information about students and employees will be accessible to all functions (with appropriate security).
   1. Across the college (all depts. and functions).

2. Across the Community College System (all colleges).
3. Across the State (all institutions and agencies) & inter-state in the future.

C. Data Warehouse: information about all colleges will be collected and stored centrally to accommodate information retrieval and reporting.
   1. Analytical: using historical data, including comparison of specific college data to community college system-wide data.
   2. Operational: retrieving and reporting using specific data (individuals, programs, colleges) as well as program-, college- or system-wide data.

D. Data inquiry, reporting and analysis software tools will be provided for casual, intermediate and advanced users.

E. Self-service: students will be able to access and update their information, including application, registration, payment and other services, without requiring assistance or service from a staff member unless problems arise.

F. Online/Real-Time: all transactions will be reflected immediately in the database and in related processes (such as a student dropping a course and immediately having their financial aid recalculated).

G. Workflow: all systems and functions will operate through electronic forms and workflow, rather than paper forms that are carried or sent from office to office.

H. Modularity and Integration of Optional Components: consistent with the North Carolina Information Resources Management Commission's Statewide Technical Architecture, optional components, such as voice response, imaging systems, etc., may be integrated into the system(s).

I. System Enhancement and Application Development: software tools will allow the enhancement and development of additional applications, to meet the specific needs of the community colleges and the Department.

The process of developing the plan for information systems for the future has been based on the assumption that the community colleges would continue to use a single, standard system. An explicit goal of the project is to ensure that the system will meet the needs of all 59 institutions, including the two community colleges whose needs are not met by the current software.

The experience of the 56 community colleges that use the current software demonstrates the significant benefits of this approach:

- consistent data definitions and formats;
- consistent processing of data, including system-wide policies and procedures;
- consistent reporting of required information, including the Annual Reporting Plan;
- software enhancements and changes in policies, procedures, data definitions, formats, etc., are incorporated into the software once for all colleges; and
- reduced costs for training, documentation and technical support provided from a central source.

In contrast, the two community colleges that currently use other software (either purchased or locally-developed) must ensure that their reports and data files conform to system-wide requirements. They must also make all changes to their software to reflect any changes in policies, procedures, data definitions, formats.

The strategy to purchase and customize an integrated system that will meet the needs of all of the community colleges will ensure that the community colleges do not find it necessary to acquire their own unique systems to meet their future needs. While it would be difficult to determine the cost of each college acquiring and supporting its own system, the experience of the two colleges that are currently doing so clearly demonstrates that this would be much more expensive and much less effective in meeting both local college and system-wide needs. Failure to provide a new information system will result in colleges purchasing their own systems.

September 26, 1997

Information Systems for the Future

Gap Analysis

1. Cultural (External) Environment

Present State	Future State
Activity-based funding	Outcomes-based funding
Activity-based credentials	Outcomes-based credentials
College- and System-based programs	Business/industry needs-based programs
Clearly defined organizations & functions	Entrepreneurial organizations
Accreditation by college	Accreditation by colleges, programs, etc.
Services for diverse population	Services for diverse population

2. Operational (College) Environment

Present State	Future State
Distance learning pilot projects	Distance learning widely implemented
College-based activities	Collaborative activities
Hierarchical organizations	Flattened organizations
Traditional functions & processes	Streamlined processes
Input & activity-based assessment	Outcomes-based assessment
Limited access to information	Widespread access to information & tools

3. Technical Environment

A. Fast

Present State	Future State
Non-SQL database	SQL-standard database
Separate curriculum & Cont. Educ. Data	Fully integrated student data
Data available at college, reported to System	Data available across colleges/System
Restricted access to data	Open access to data (within legal reqmts)
	Institutions not constrained by System (& vice-versa)

B. Flexible

Present State	Future State
College-level systems internally compatible	Data compatible across college-level & state-level systems and with external applications
	Electronic Data Interchange via standard formats
	Conversion & migration to new versions & environments/technologies facilitated by standards-based systems
	Workflow & email-based applications are provided
	User defined data, procedures & tools are supported through standards

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INFORM statements used to retrieve data

Integrated system meets all colleges' needs

Modular components provided to meet colleges' functional needs
Systems supported at local college & System office
Data warehouse for reporting & analysis across colleges and over time accessible to colleges, etc.

C. Focused

Present State

Terminal-based user interface

Common data elements
Access by administrators & staff only

Information via pre-defined reports & INFORM reports

State-level databases on central system

Controlled access to data

Future State

Both terminal-based and graphical user interface provided for appropriate functions
Common data elements across applications
Student access to information within legal/policy requirements
Variety of reports and tools supported via standards
Comprehensive instructional management support
Data warehouse for reporting & analysis across colleges and over time accessible to colleges, etc.
Security mechanisms to provide flexible access
Effective standards for data & reporting

D. Friendly

Present State

Limited support capabilities

Multiple logons for separate functions

Future State

Operational & analytical systems supported at System & college level as appropriate
Single logon w/ authentication for all functions
Usable by infrequent users via graphical user interface & on-line documentation
Interface with variety of applications through standards

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